

ROLL UP TONNEAU COVER SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of United States Patent Application No. 10/331,711 filed on December 30, 2002. The disclosure of the above application is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention generally relates to coverings for pickup trucks and, more particularly, relates to a roll up tonneau cover system.

BACKGROUND OF THE INVENTION

[0003] Tonneau covers have been used for a number of years to cover the cargo box of pickup trucks against dirt, debris, and other environmental contaminants and to improve the aesthetic quality thereof. Originally, tonneau covers were designed by upholstery shops and typically made of vinyl covered fabrics or canvas. The material was often doubled over along its edges for added strength and appearance. Male snaps were then attached to the sides of the cargo box of the pickup truck via fasteners, while female snaps were attached along the edges of the cover. Wooden bows were sometimes used to span the cargo box and ensure that the cover remained high enough to drain water. Unfortunately, these covers were sometimes difficult to handle, often led to corrosion around the snaps, and occasionally failed to protect the cargo box.

[0004] However, in the '70's, in an attempt to overcome the corrosion around the snaps, tonneau rails were removably mounted to the cargo box of the pickup truck using clamps. These tonneau rails carried the aforementioned snaps and, thus, eliminated the need to mount the snaps directly to the walls of the cargo box.

[0005] However, with the continued development of tonneau covers over the years, there has been a need to eliminate a number of disadvantages—such as, flapping of the tonneau covers in the wind while the vehicle is under motion, lack of retention of the tonneau covers along the forward portion of the truck bed, inability to maintain the proper tension in the tonneau cover, and the like. Therefore, there exists a need in the relevant art to overcome these disadvantages and many others that are commonly experienced in the art.

SUMMARY OF THE INVENTION

[0006] According to the principles of the present invention, a tonneau system for a cargo box of a vehicle having an advantageous construction is provided. The tonneau system includes a support frame having a front rail member, a cover spanning the support frame, and a cantilever beam assembly flexibly coupled with the front rail member. An adjustment support bracket extends from at least one of the rail members and includes a finger member. The finger member is engageable with the cantilever beam assembly to bias the front rail member into a first direction to generally maintain a tension in the cover.

The cantilever beam assembly is generally contained within the front rail member.

[0007] Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

[0009] FIG. 1 is a perspective view illustrating a pickup truck having a tonneau cover system according to a first embodiment of present invention;

[0010] FIG. 2 is a cross sectional view illustrating the frame rail assembly taken along line 2-2 of FIG. 1;

[0011] FIG. 3 is a plan view illustrating the front rail member and frame rail assembly;

[0012] FIG. 4 is a partial cross sectional view illustrating the front rail member and frame rail assembly taken along line 4-4 of FIG. 3;

[0013] FIG. 5 is a partial cross sectional view illustrating the front rail member and frame rail assembly taken along line 5-5 of FIG. 3;

[0014] FIG. 6 is a perspective view illustrating the retaining mechanism;

[0015] FIG. 7 is a partial cross sectional view illustrating the rear rail member and frame rail assembly shown in a locked position;

[0016] FIG. 8 is a partial cross sectional view illustrating the rear rail member and frame rail assembly shown in an intermediate position;

[0017] FIG. 9 is a partial cross sectional view illustrating the rear rail member and frame rail assembly shown in an unlocked and upwardly urged position;

[0018] FIG. 10 is a perspective view illustrating an adjustment beam mechanism according to a second embodiment of present invention in a first position with portions removed for clarity;

[0019] FIG. 11 is a plan cross sectional view illustrating the adjustment beam mechanism in the first position;

[0020] FIG. 12 is an end cross sectional view illustrating the adjustment beam mechanism in the first position;

[0021] FIG. 13 is an exploded perspective view illustrating the adjustment beam mechanism;

[0022] FIG. 14 is a plan cross sectional view illustrating the adjustment beam mechanism in a second position with portions in phantom and employing an optional shim member;

[0023] FIG. 15 is an end cross sectional view illustrating the adjustment beam mechanism in the second position;

[0024] FIG. 16 is a perspective view illustrating an adjustment beam mechanism according to a third embodiment of present invention in a first position with portions removed for clarity;

[0025] FIG. 17 is an enlarged perspective view illustrating the adjustment beam mechanism of FIG. 16 in the first position; and

[0026] FIG. 18 is an enlarged perspective view illustrating the adjustment beam mechanism of FIG. 16 in a second position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] The following description of the preferred embodiments is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses.

[0028] With reference to FIG. 1, a pickup truck 10 is shown having a roll up roll up tonneau system 12 which is attached to a cargo box 13 according to the present invention. Cargo box 13 has a front wall 14, a left sidewall 16, a right sidewall 18, and a rear wall or tailgate 20. Roll up roll up tonneau system 12 includes a flexible, stretchable fabric cover 22 that is drawn tightly over a substantially rigid rail support system 24 and removably attached to rail support system 24. Rail support system 24 is comprised of a number of frame rails that are attached to one another to form a rectangular frame. The frame rails included are a front frame rail or head rail assembly 26, a left side frame rail assembly 28, a right side frame rail assembly 30, and a rear frame rail assembly

32. Rail support system 24 is aligned with the top of sidewalls 16 and 18 of cargo box 13 as well as the top of front wall 14 and tailgate 20.

[0029] It should be understood that right sidewall 18 and left sidewall 16 of pickup truck 10 and the corresponding right side frame rail assembly 30 and left side frame rail assembly 28 are identical in construction, yet arranged in mirrored symmetry. Accordingly, in the interest of brevity, only one side will be discussed in detail below unless noted otherwise.

[0030] As best seen in FIG. 2, right side frame rail assembly 30 is coupled to right sidewall 18 of cargo box 13 of pickup truck 10. As can be seen, sidewall 18 of cargo box 13 includes a generally horizontal top surface 34 and a downwardly extending inside wall 36. However, it should be appreciated that generally horizontal top surface 34 and downwardly extending inside wall 36 may have any one of a number of configurations, which are dependent upon styling and functionality determined by the vehicle manufacturer. Hence, it should be understood that the particular shape of these surfaces/walls may vary, along with the specific shape of those corresponding components of frame rail assembly 30.

[0031] Still referring to FIG. 2, frame rail assembly 30 generally includes a support bracket 38, a hanging side member 40, and a back member 42. Support bracket 38 includes a first horizontal portion 44 having a channel 46 formed therein. Channel 46 is generally defined by a pair of upturned and inwardly projecting flanges 48. Channel 46 is sized to receive one of a cooperating pair of strips of a hook-and-loop fastener system 49—that is, a first strip 50 of the pair is disposed in channel 46 and the corresponding second strip

51 of the pair is mounted on fabric cover 22. Preferably, the hook-and-loop fastener system is made of VELCRO®. However, it should be understood that alternate suitable fasteners may be used, such hook and hook material, other self-adhesive material, magnetic tape on steel, tongue and groove, and the like. Frame rail assembly 30 further includes a downwardly extending portion 52 that terminates into a second horizontal portion 54. Second horizontal portion 54 is adapted to support an adjustment mechanism that will be discussed in detail below.

[0032] With continued reference to FIG. 2, frame rail assembly 30 still further includes a second downwardly extending portion 56 extending from an intermediate section of first horizontal portion 44 generally adjacent inside wall 36 of sidewall 18. Second downwardly extending portion 56 receives a flat seal 58 preferably adhesively coupled thereto. Flat seal 58 is adapted to engage inside wall 36 of sidewall 18 to define a fluid sealing connection therebetween. Flat seal 58 may be made of any suitable material that would at least inhibit inflow of water, dirt, debris, or other environmental contaminants.

[0033] To further prevent the influx of water, dirt, debris, or other environmental contaminants from entering cargo box 13 through the interface between support bracket 38 and sidewall 18, a second seal 60 is provided. Specifically, as can be seen in FIG. 2, first horizontal portion 44 extends outboard such that an overlapping outboard section 62 overlaps a portion of top surface 34 of sidewall 18 while an inboard section 63 cantilevers inward into cargo box 13. Second seal 60 is preferably D-shaped and extends downwardly from

overlapping outboard section 62 such that second seal 60 compressibly engages top surface 34 of sidewall 18.

[0034] The overlap of overlapping outboard section 62 relative to top surface 34 provides a number of useful advantages over the prior art. Specifically, such overlapping relationship between support bracket 38 and sidewall 18 defines a positive positioning reference during installation of roll up tonneau system 12. Additionally, the weight exerted on support bracket 38 causes second seal 60 to be further compressed against top surface 34 of sidewall 18, thereby further ensuring a reliable sealing connection. Still further, the use of flat seal 58 and second seal 60 provide a double sealing connection along both horizontal and vertical surfaces. Unlike the prior art that seals only along a vertical surface, the present invention does not readily permit water to lie upon the vertical sealing surface, which considerably improves the sealing characteristics.

[0035] Turning now to the clamping system of the present invention, hanging side member 40 and back member 42 cooperate to retain support bracket 38 to sidewall 18. In particular, hanging side member 40 is shown being generally planar in construction with a hooked flange 64 formed on an upper end 66 and a series of alignment depressions 68 formed on an opposing end 70. Hooked flange 64 is sized to cooperate with a corresponding flange 72 extending upwardly from second downwardly extending portion 56 so that hanging side member 40 can hang from second downwardly extending portion 56 during

installation. Hanging side member 40 further includes an aperture 73 formed therein to receive at least one fastener 74.

[0036] Back member 42 is shown being generally U-shaped in construction having an alignment head 76 formed on a lower end 78 and an engaging head 80 formed on an upper end 82. Alignment head 76 is preferably curved in shape and sized to be received within one of the series of alignment depressions 68. Engaging head 80 preferably includes a pair of outwardly extending flanges 84 adapted to retain a contact member 86. Contact member 86 is preferably made of a soft rubber material to prevent damage to inside wall 36 of sidewall 18. However, contact member 86 is optional and, thus, may be eliminated or replaced with other material. Still further, back member 42 includes a retaining nut 88 that cooperates with fastener 74 to apply a clamping force upon inside wall 36 of sidewall 18 to retain support bracket 38 in position. Retaining nut 88 is preferably held by retaining flanges 90, which serve to hold retaining nut 88 in position and fixed against rotation. However, it should be understood that other fastener systems may be used, such as a quick release clamping mechanism or other known means.

[0037] During clamping, back member 42 is first loosely fastened to hanging side member 40 via fastener 74 and retaining nut 88. Hanging side member 40 is then conveniently inserted such that hooked flange 64 engages corresponding flange 72 to permit hanging side member 40 and back member 42 to hang from such position. By maintaining hanging side member 40 and back member 42 in a loosely fitting arrangement, back member 42 may be

positioned along a backside of inside wall 36. Back member 42 may also be positioned vertically relative to hanging side member 40 by moving alignment head 76 into one of the series of alignment depressions 68, thereby adjusting the position of contact member 86 upon inside wall 36. In order to facilitate such adjustment, it can be seen that aperture 73 formed in hanging side member 40 is preferably a slot to permit the vertical translation of fastener 74 relative to hanging side member 40. Fastener 74 is then tightened to apply a clamping force upon inside wall 36 to retain support bracket 38 in position and further compress flat seal 58. It should be appreciated that the present arrangement simplifies installation of roll up tonneau system 12 in that the clamping mechanism need not be held in place by a user with one hand while simultaneously tightening fastener 74 with the other hand, as required in the prior art. Additionally, due to the hanging feature of hanging side member 40 and overlapping outboard section 62 of first horizontal portion 44, frame rail assembly 30 can not be easily removed from pickup truck 10 nor will the clamping mechanism fall out of position or tonneau cover 22 drop down should fastener 74 become loosened.

[0038] Turning now to FIGS. 3-11, head rail assembly 26 will now be discussed in detail. As best seen in FIG. 3, head rail assembly 26 generally includes a forward rail member 92 that extends in the cross-car direction generally in plane with front wall 14 of cargo box 13. Forward rail member 92 receives an attachment member 94 coupled to fabric cover 22 within a receiving channel 96 formed in an upper surface of forward rail member 92 to define the

forward edge of coverage of roll up tonneau system 12. Receiving channel 97 formed in forward rail member 92 receives a bulbous seal 99 that has a first portion 105 disposed in receiving channel 97, a second D-shaped portion 103 coupled to first portion 105, and a downwardly biased, curved wiper seal 101 that engages the top of front wall 14 to providing a sealing engagement therebetween. Forward rail member 92 is preferably hollow to minimize weight and generally rectangular in cross section. At an end opposing receiving channel 96, forward rail member 92 includes a generally curved portion 98. Generally curved portion 98 is adapted to engage a corresponding curved channel 100 disposed at a forward end of an adjustment support bracket 102. A recess 104 is formed above generally curved portion 98 on forward rail member 92 to prevent interference with a protruding flange 106 extending from adjustment support bracket 102. Accordingly, when fabric cover 22 is installed above rail support system 24, generally curved portion 98 of forward rail member 92 may be inserted into curved channel 100 in an inclined position and then rotated forward relative to the vehicle into the illustrated lowered position. During this movement, generally curved portion 98 smoothly rotates with curved channel 100.

[0039] As best seen in FIGS. 5 and 6, in order to retain forward rail member 92 in this lowered position, a retaining mechanism 108 is provided. Retaining mechanism 108 includes a latch member 110 slidably coupled to forward rail member 92 via a fastener 112, such as a thumb screw, and nut 114, such as an elongated nut or T-nut. Nut 114 is slidably retained with a lower C-shaped channel 116 (FIG. 4) extending along an underside of forward rail

member 92. Latch member 110 includes a cantilevered portion 118 adapted to be positioned adjacent an underside of second horizontal portion 54 of support bracket 38 to prevent the removal of forward rail member 92 relative to support bracket 38. Retaining mechanism 108 further includes a guide locator 120 having a screw 122 retaining a fixed locator 125. It should be understood that guide locator 120 may be made integral with latch member 110. Lastly, a plurality of steps 123 are disposed along the upper side of latch member 110 to provide the necessary spacing of cantilevered portion 118 from second horizontal portion 54.

[0040] Referring again to FIGS. 3 and 4, an adjustment mechanism 124 is provided for engagement with forward rail member 92 to selectively position forward rail member 92 in a further fore or aft position to adjust the tightness of fabric cover 22. This preferred position of forward rail member 92 may vary depending upon installation, age of fabric cover 22, environment temperatures and moisture levels, and the like. To effect such adjustment, adjustment mechanism 124 includes adjustment support bracket 102 that is fixedly coupled via conventional methods to second horizontal portion 54 of support bracket 38. Adjustment support bracket 102 is generally box-shaped having protruding flanges 106 extending from a forward end thereof.

[0041] Adjustment support bracket 102 further includes an adjustment bolt 126 having a head portion 128 and an engaging portion 130. Head portion 128 extends beyond an aft end of adjustment support bracket 102, while engaging portion 130 engages forward rail member 92. Specifically, engaging

portion 130 engages a generally flat portion 132 formed in curved portion 98 to mate with engaging portion 130 of adjustment bolt 126. It should be noted that generally flat portion 132 might include a lower edge 134 that is held by engaging portion 130 of adjustment bolt 126, which aids in retaining forward rail member 92 in a lowered position.

[0042] Adjustment mechanism 124 further includes a nut 136, which is preferably a wing nut having wings that engage interior side surfaces 138 of adjustment support bracket 102 to prevent nut 136 from rotating relative to adjustment support bracket 102. A spring 140 extends between nut 136 and an interior end surface 142 of adjustment support bracket 102 to providing a biasing force against nut 136. The length of spring 140 is chosen such that the shrinkage or expansion with temperature of fabric cover 22 will not cause the spring force to vary greatly, thus maintain the tension in fabric cover 22 nearly constant. Accordingly, as adjustment bolt 126 is driven inward (forward), engaging portion 130 is driven in contact with generally flat portion 132 of forward rail member 92, thereby driving forward rail member 92 forward. Further forward displacement of forward rail member 92, and corresponding fabric cover 22, continue until the tension in fabric cover 22 generally equals the biasing force of spring 140. Therefore, according to the present arrangement, fabric cover 22 is ensured to remain taut, even during environment temperature and moisture changes and age. However, should further adjustment of fabric cover 22 be necessary, adjustment bolt 126 may simply be further driven forward.

[0043] Although, as seen in FIGS. 3 and 4, an adjustment limit 144 may be used to prevent excessive adjustment of forward rail member 92 in either the fore or aft direction. To this end, adjustment limit 144 includes a bolt 146 coupled to a nut 148 disposed in lower channel 116 of forward rail member 92. Bolt 146 downwardly extends and is received with an aperture 150 formed in second horizontal portion 54 of support bracket 38. By way of non-limiting example, it is anticipated that adjustment limit 144 would limit the adjustment of forward rail member 92 to within about 1" of fore and aft movement. Furthermore, aft movement is limited by the interface between curved portion 98 and corresponding curved channel 100. Adjustment limit 144 prevents forward rail member 92 from sliding forward when fabric cover 22 is rolled up into a forward open position at the front of cargo box 13. When fabric cover 22 is in the closed position, the combination of biasing force from spring 140 and inherent tension within fabric cover 22 maintains adjustment limit 144 and forward rail member 92 in proper position.

[0044] As best seen in FIG. 3, each support bracket 38 preferably receives a pair of bumper members 141 disposed on opposing ends of support bracket 38 in a space defined by first downwardly extending portion 52, a portion of first horizontal portion 44, and second downwardly extending portion 56. Bumper member 141 preferably has a plurality of retaining ridges 143 to engage first downwardly extending portion 52, a portion of first horizontal portion 44, and second downwardly extending portion 56 to maintain bumper member 141 within the aforementioned space. Each of the pair of bumper members 141 includes a

head portion 143 and a base portion 145. Head portion 143 engages front wall 14 or tailgate 20, while base portion 145 is received in the defined space. Once installed, bumper members 141 engage front wall 14 or tailgate 20 of pickup truck 10 and act to align, maintain, and hold support bracket 38 and, thus frame rail assembly 30 in a generally centered fore-aft position. Furthermore, bumper members 141 further serve to properly position seals 103 and 161 relative to front wall 14 and tailgate 20, respectively.

[0045] Turning now to FIGS. 7-9, a rear latching mechanism 152 will be described in detail. As can be seen in the figures, rear latching mechanism 152 shares a number of parts with head rail assembly 26. In particular, rear-latching mechanism 152 includes the aforementioned forward rail member 92, referenced as rear rail member 92' hereinafter, and adjustment support bracket 102, referenced as support bracket 102' hereinafter. It should be appreciated that such use of members in multiple locations within roll up tonneau system 12 provides a number of manufacturing and assembly efficiencies. In the interest of brevity, specific reference and explanation of components shared between head rail assembly 26 and rear frame rail assembly 32 will not be discussed.

[0046] With particular reference to FIG. 7, rear-latching mechanism 152 includes support bracket 102' being coupled to support bracket 38 via conventional means, such as fasteners. Rear rail member 92' receives attachment member 94 coupled to fabric cover 22 within receiving channel 96 formed in rear rail member 92' to define the rear edge of coverage of roll up tonneau system 12. Rear latching mechanism 152 still further includes a latching

pawl 154. Latching pawl 154 is generally L-shaped having a latching hook 156, a trigger/ejector head 158, and a centrally located pivot 160. Latching hook 156 is shaped to selectively engage a flange 162 extending within C-shaped lower channel 116. Latching hook 156 extends through an aperture 164 formed in second horizontal portion 54 of support bracket 38. Aperture 164 is equidistant from an end of support bracket 38 compared to aperture 150 to permit support bracket 38 to be used on either a left or right side of cargo box 13. Trigger/ejector head 158 is positioned near a rear end of rear rail member 92' to permit easy actuation by a user. Trigger/ejector head 158 includes a protrusion 166, which may extend through an aperture 168 to engage and translate rear rail member 92' upward to signal to a user that rear rail member 92' has been sufficiently unlatched. It should be understood that the length of trigger/ejector head 158 from pivot 160 may be increased relative to the length of latching hook 156 from pivot 160 for increase mechanical advantage. Rear latching mechanism 152 further includes a spring 170 biasing latching hook 156 in an engaged and locked position.

[0047] As seen in FIGS. 7-9, as trigger/ejector head 158 is depressed in a counter-clockwise direction, trigger/ejector head 158 pivots upward about pivot 160. Such rotation disengages latching hook 156 from flange 162. Continued depression of trigger/ejector head 158 causes trigger/ejector head 158 to engage an underside of rear rail member 92', thereby pivoting rear rail member 92' about curved portion 98. Rear rail member 92' may then be removed from support bracket 102'.

[0048] Receiving channel 97 formed in rearward rail member 92' receives a bulbous seal 161 that has a first portion 163 slidably disposed in receiving channel 97, a second D-shaped portion 165 coupled to first portion 163, and an upwardly inclined wiper seal 167 that engages the side of tail gate 20 to provide a sealing engagement therebetween. Upwardly inclined wiper seal 167 and second portion 165 cooperate to form a channel 169 to collect and direct water outwardly.

[0049] Following disengagement of rear latching mechanism 152, rear rail member 92' may be rolled forward to gather fabric cover 22 at a forward location. To this end, it should be appreciated that the generally horizontally disposed hook-and-loop fastener system 49, unlike prior art configurations, provides a simple "peel-off/on" arrangement in a direction perpendicular to the attachment plane of hook-and-loop fastener system 49. Prior art systems often require additional layers of vinyl to separate the VELCRO® strips prior to attachment. Additionally, other prior art systems require a shearing action in order to disengage the VELCRO® strips. These systems require additional complexity to attach and additional force to separate and further limit the life of the VELCRO® strips. The "peel-off/on" arrangement of the present invention in a direction of perpendicular to the attachment plane provides improved simplicity in engagement and disengagement of hook-and-loop fastener system 49 and further improves the useful life thereof. This gentle action further permits the present invention to use aggressive hook-and-loop fastener systems that do not require them to be pushed into place; however, they are loaded in shear by fabric

cover 22 yet may be released with a gentle peeling action. It should be appreciated that hook-and-loop fastener system 49 of the present invention is disengaged by a simple rolling of fabric cover 22 to its forward position.

[0050] Referring now to FIGS. 10-15, an alternative embodiment of the present invention is illustrated that employs an adjustment beam mechanism 200 engageable with a forward rail member 92" in place of adjustment mechanism 124 (see FIGS. 3 and 4). Adjustment beam mechanism 200 is provided for maintaining a constant tensional force on fabric cover 22 to a desired tightness.

[0051] Still referring to FIGS. 10-15, adjustment beam mechanism 200 includes a cantilever beam member 202 having a first end 204 and a second end 206. First end 204 of cantilever beam member 202 includes a plurality of aperture 208 for receiving fasteners therethrough to fixedly mount cantilever beam member 202 to forward rail member 92". Specifically, a mounting bracket 210 is slidably engaged in slot 212 of forward rail member 92". Mounting bracket 210 is preferably sized to permit simple positioning of mounting bracket 210 and cantilever beam member 202 relative to forward rail member 92" when the fasteners are loosened. However, on the other hand, mounting bracket 210 should preferably frictionally engage flanges 214 when the fasteners are tightened.

[0052] Additionally, as seen in FIG. 14, adjustment beam mechanism 200 may include an optional shim member 216 positioned and retained between cantilever beam member 202 and mounting bracket 210. Shim member 216 is adapted to provide an initial biasing force in cantilever beam member 202

through the inclined positioning of cantilever beam member 202 (see hypothetical unrestrained position 202' illustrated in phantom in FIG. 14). Due to the construction of forward rail member 92", cantilever beam member 202 is initially urged against an outer pair of flanges 218 formed in forward rail member 92", which retain cantilever beam member 202 in a first position. As will be described below, cantilever beam member 202 can be flexed between the first position (FIG. 10) and a second position (FIG. 14). Cantilever beam member 202 and the associated mounting members are generally concealed out of view within forward rail member 92".

[0053] Still referring to FIGS. 10-15, adjustment beam mechanism 200 further includes a finger member 220 of support bracket 38'. Finger member 220 is sized to extend upward from support bracket 38' in a generally L-shaped configuration. An end 222 of finger member 220 is engageable with first end 204 of cantilever beam member 202. Such engagement of finger member 220 against the biasing force of cantilever beam member 202 cause forward rail member 92" to be urged forward (relative to the vehicle) into the second position to draw stretchable fabric cover 22 tightly over rigid rail support system 24.

[0054] This arrangement provides a method of eliminating spring 140 and its associated components and further provides a method of concealing cantilever beam member 202 from view. It should be understood that cantilever beam member 202 may be prebent to eliminate the need for shim member 206. It is generally desired that adjustment beam mechanism 200 is disposed on each side of the vehicle bed to provide equal tensioning thereabout. Specifically, it is

desired that adjustment beam mechanism 200 is arranged to provide about 15 to 20 pounds of tensioning force on each side.

[0055] As best seen in FIGS. 10, 12, and 15, the present embodiment may also employ an alternative adjustment limit 144' in place of adjustment limit 144. Like adjustment limit 144, adjustment limit 144' may be used to prevent excessive adjustment of forward rail member 92" in either the fore or aft direction. To this end, adjustment limit 144' includes a recessed slot 224 formed in an underside of forward rail member 92". Recessed slot 224 has a forward edge 226 and a rearward edge 228. An upturned edge 230 is further provided at an end of support bracket 38'. Upturned edge 230 is adapted to extend within recessed slot 224 and engage either forward edge 226 or rearward edge 228 to limit the fore and aft movement of forward rail member 92". By way of non-limiting example, it is anticipated that adjustment limit 144' would limit movement of forward rail member 92" to within about 3/4" to 1".

[0056] Referring now to FIGS. 16-18, another alternative embodiment of the present invention is illustrated that employs an adjustment beam mechanism 300 engageable with a forward rail member 92'" in place of adjustment mechanism 124 (see FIGS. 3 and 4). Adjustment beam mechanism 300 is provided for maintaining a constant tensional force on fabric cover 22 to a desired tightness.

[0057] Still referring to FIGS. 16-18, adjustment beam mechanism 300 includes a cantilever beam member 302 having a first end 304 and a second end 306. First end 304 of cantilever beam member 302 includes a plurality of

aperture 308 for receiving fasteners therethrough to fixedly mount cantilever beam member 302 to forward rail member 92'" in a similar configuration as described above. Cantilever beam member 302 is preferably preshaped to include a bend sufficient to product the desired biasing force in operation. The extent of this prebend is dependent upon the size of the cover system and the materials used.

[0058] Second end 306 of cantilever beam member 302 is adapted to be received within a slot 310 formed in support bracket 38". Slot 310 is formed in the vertical face of support bracket 38" and is sized to retain cantilever beam member 302 therein. In this regard, through the contact between cantilever beam member 302 and the forward and rearward edges 312, 314 of slot 310, forward rail member 92'" is biased in both a fore and aft direction relative to support bracket 38". This is particularly useful in that it permits more accurate retention and positioning of forward rail member 92'" relative to known prior art designs. Additionally, this arrangement simplifies the design and minimizes the number of parts required, thereby reducing cost. It should also be understood that this arrangement is equally useable between support bracket 38" and rear rail member 92'.

[0059] Similar to the second embodiment illustrated in FIGS. 10-15, this arrangement provides a method of eliminating spring 140 and its associated components and further provides a method of concealing cantilever beam member 302 from view. It is generally desired that adjustment beam mechanism 300 is disposed on each side of the vehicle bed to provide equal tensioning

thereabout. Specifically, it is desired that adjustment beam mechanism 300 is arranged to provide about 15 to 30 pounds of tensioning force on each side.

[0060] The description of the invention is merely exemplary in nature and, thus, variations that do not depart from the gist of the invention are intended to be within the scope of the invention. Such variations are not to be regarded as a departure from the spirit and scope of the invention.